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ABSTRACT

This paper outlines the procedures used to implement and test the CARL version C100 circulation system at the University of Colorado's Boulder Campus. Intended to serve as a guide to other libraries implementing new circulation software, the paper describes a broad approach to testing such software, describes procedures that speed and organize the process, and suggests staffing levels and equipment to have available. The focus is on describing methods to test the accuracy of data transfer, determine the functionality of the features, and to confirm that the local parameters interact properly with all circulation functions. The following steps are covered: (1) test preparations, such as involving technical staff and organizing work area and materials; (2) documenting the transfer of data from the old system to CARL by preparing forms for checking the accuracy of the transfer and providing a means, such as fax or email, to document discussions with CARL about problems identified during the test; (3) implementing test procedures to check the accuracy of the transfer of data on materials, patron records, and transactions; (4) testing to make sure functions and features, such as In-transit, Added Borrower, and Renew-All, perform as they are supposed to; (5) stress testing the system by such means as adding 500 books to a patron's account and renewing them all; (6) alert CARL that the system is ready to go live after identified problems are cleared up; and (7) continuing to retest critical elements such as parameters and functions after the system goes live. The prospective user of these guidelines is warned that although testing is time and labor intensive, it is essential; even though others have implemented the system, there may still be bugs that have not been resolved. (KRN)

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The Year of Living Dangerously
Implementing CARL New Circulation at CU Boulder

My discussion addresses the testing of CARL's new circulation at your site. My intent is to

- ❑ outline a broad approach to organize the process,
- ❑ describe some procedures you may want to consider, and,
- ❑ suggest some documentation you may want to have on hand.

IMPLEMENTATION SEQUENCE

The entire implementation sequence is straightforward:

- ❑ Holdings, patron, and transaction files are duplicated, converted, and loaded into a test system along with your parameters and displayed on a specially designated terminal you select.
- ❑ Test for the:
  - ➨ accuracy of data transfer,
  - ➨ functionality of each feature,
  - ➨ interaction between parameters and functions.
- ❑ With all corrections made to the test system, the live files are frozen and converted. The corrected software is loaded and brought up live.
- ❑ Once the new system is running live at the circulation desks, you need to retest the live files again for:
  - ➨ accuracy of data transfer,
  - ➨ functionality of each feature,
  - ➨ if parameters correctly interact with functions.

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Essentially, I'll talk about that second step in detail, that is: verifying the accuracy of the the data transfer, functionality of features, and parameter interaction.

The purpose of testing is to:

- confirm that records were converted properly,
- determine that the functions operate as expected, and,
- establish that the software is interacting with the parameters correctly.

For example, you have to be confident that a patron who charged seven books on the old system still has seven charged after the new system is installed. You'll need to be confident that the parameters work properly in every instance. You need to confirm that the functions work as they are described in the documentation.

Broadly, you'll test for two things:

- accuracy of data transfer, and,
- functionality of the features.

For example, did the media codes, due dates, fines, patron addresses, and so on, transfer correctly? Do the functions—Renew-All, In-transit, fiscals, etc.—actually work? The objective is to confirm such things, identify the problems, and have most problems resolved in time to implement the new system according to the schedule you had established.

PREPARING FOR TESTING

Communication & Personnel

Long before your test files are created, there are certain things you can prepare that will make the testing process much more efficient.

There are individuals, both inside and outside of your department, that need to be made aware of what is happening and the implications. There is quite a bit of documentation that can be prepared in advance. There is equipment that needs to be set aside. Staff time to the effort can be assigned.

As early as possible begin talking with the people who will be directly and indirectly involved with the conversion and develop a means to keep them informed. Don't underestimate how large a group of people that can be.

For example, Boulder has six circulation desks scattered all across campus. There were about 20 technical level staff who had a real stake in the outcome of the testing process but were not active in process. Unless such people are involved or kept informed the rumors can quickly overtake reality. Circulation staff need to see the system early on—perhaps through an early training session—then kept informed of progress as part of regular circulation meetings, or with memos, or through electronic mail.

There are also people outside of circulation that need to be involved. The Holdings file will be converted, and those records will be different. Consequently, there will be some technical services staff who need to be kept informed of progress. They

will need to be involved with the scheduling of final implementation, since it will bring down the Holdings file.

Remember, things can go wrong that impact those departments. For example, when Boulder's circulation went live our Bibliographic Maintenance Unit couldn't write holdings records for days.

Documentation

In addition to drawing people into the process and making sure that key individuals are informed, there is some documentation you can prepare prior to bringing up the test system. And by preparing this in advance, you'll make much more efficient use of your testing time.

The most obvious pieces of documentation you should have on hand are your revised parameters and copies of the new circulation manual.

You may also consider preparing an outline of the various system functions and who will be responsible for testing them. You may want one person to test your fiscals, another to test conversion, and someone else to check parameters. There are real advantages to testing that way, but it's easy to lose control of the process when it's split between several staff. A document outlining who is to check what will help direct the entire process. Anne Harmon and Steve Wrede developed a very good outline based upon the UNC conversion. You may want to adapt that.

About a week before testing, we developed some charts to help manage the detailed checking. For example, this particular one has borrower types on the side with all possible parameters across the top—number of renewals allowed,

maximum number of charges, *etc.* The cells are empty. The chart can be given to a student assistant. By charging and renewing books at the test terminal, they simply fill in the blanks based on what the system is doing.

I think this method has a couple of advantages. First, it regulates a tedious process to someone else. More importantly, the detail is being checked by someone who doesn't know the answers in advance. Consequently, they probably don't have the expectations and assumptions as someone who works with the system may have.

User Type	LOAN PERIODS* (in Days)						FISCALS (Account Type)								CHARGES		FINES		LOST		RECALL		HOLD	
	7	28	90	180	999		1	2	3	4	A	L	S	N/A	20	Unlimited	Yes	No	Yes	No	Yes	No	Yes	No
RECIP																								
UCFS																								
UCU																								
UCG																								
UCBTF																								
UCBTS																								
SUMSTF																								
INSTWK																								
AFFIL																								
FRIEND																								
CATECS																								
NEWSHF																								
DEPT																								
ILL																								
BINDERY																								

Checking for lost charges and fines can be made easier by the same process. At Boulder, there are about a dozen different time frames in which an item can become overdue or go lost mostly depending upon the media code but also on the borrower type. Additionally, some of our borrower types don't get fined, some get blocked and charged for lost books, and others just get blocked. Confirming all the

possible interactions between Borrower types and media codes can be very confusing.

Borrower Type	Patron ID	Media Code	Item Number	$ Fine	$ Lost	Block
RECIP	123-45-6789	1D	U18301 2563983			
		1X	U18301 8763209			
		2D	U18301 3987127			
		2X	U18301 6788903			
		3D	U18301 8844229			
		3X	U18301 5409832			
		7D	U18301 3456629			
		7X	U18301 3209432			
		RE	U18301 5499801			
		2W	U18301 8294625			
		MR	U18301 4236747			
		MX	U18301 2194566			
		NO	U18301 3299887			
		LO	U18301 7654009			
		Blank	U18301 0458202			
UCFS	234-56-7890	1D	U18301 6778903			
		1X	U18301 8842229			
		2D	U18301 5409832			
		2X	U18301 3098629			
		3D	U18301 7659432			
		3X	U18301 2167801			
		7D	U18301 8344625			
		7X				

This sheet has 7 columns: Borrower Type, Patron ID, Media Code, Item Number, $Fine, $Lost, and Block. So, for example, Borrower Type called RECIP with this ID has each of these item numbers charged to it. Each item represents one of all Boulder's possible media codes.

One copy of the list goes to CARL; keep another for yourself. CARL will cause all the books to go lost. Using this list and your parameters report, you can determine if the items are fined, billed lost, and blocked appropriately. As you do this several times and check off the results, any problems will appear as patterns.

So, review your parameters prior to testing and think of ways in which they interact. Any time they interact, you can design a table for testing. Your testing time will be much more productive and organized.

Printouts

In addition to the parameters, the manual, an outline, and some tables, you'll need printouts. Just before your test system is brought up, print out examples of:

- ❑ patron records,
- ❑ holdings records, and
- ❑ detail screens from Patron Inquiry of books charged to various accounts and any fines assessed.

Assign a student to make as many printouts as they can—if possible a couple hundred each.

Materials

In addition to all the documentation, you'll need books on hand to be able to use during testing. Have several hundred ready. You'll probably want to charge the books to a special code on the old circulation system so they will display as "checked out" on PAC. That way patrons can place a Hold or a Recall on the item.

The reason for this many items will become apparent when I talk about the testing process.

Equipment

Finally, you're going to need some equipment. You'll need at least one CARL terminal, however, I recommend two. These will be used to display the test files once they are available. Each should have light wands and printers. Make sure a telephone is nearby. Also, you'll want to have all those books you charged out next to the terminal. Shelving or booktrucks are going to be necessary. In a perfect world, you would have a fax beside you, too. But wherever the fax is located, plan on using it heavily during testing. You may want to make arrangements in advance with whoever is responsible for that machine.

You may also want to consider having a terminal nearby through which you can send electronic mail. In our testing process we used email extensively. By sending an email message (not CARL email) you can copy in any individual or group of individuals while building a historical file of the process.

Having a written record is extremely helpful. A telephone conversation is expedient, but after a couple of weeks you won't remember if you really discussed a problem, what was resolved, or the resolution. We have well over 150 pages of email documentation of this process. I can't overemphasize how useful it is to be able to refer to a specific message sent on a specific day.

Returning to the equipment: you'll want the test terminals to be located away from the circulation desk. You won't get anything done if you have constant interruptions. Also, you don't want anyone mistaking a test terminal for one running live circulation.

That outlines the documentation, equipment and personnel concerns you can prepare in advance. Between the parameters, manual, outline, grids and printouts, you'll end up with quite a stack of paper, but you'll use it all. Preparing in advance will save a lot of labor later and will make the testing much more efficient. And this process needs to be efficient. Don't underestimate the amount of time or labor this will take.

TESTING PROCEDURES

Now, at some point, you'll have a test system running on its own terminal and a mound of documentation in a remote room someplace. The test terminals are independent of the live system running at the front desk. They operate in a universe of there own. If, for example, you look at one of the books charged out earlier for testing it will say "checked out" in the live system. In the test system, however, you can take the same book, discharge it, charge it to someone else, cause it to go lost, change the media code, recall it, and return it. If you look back at the live system, the record hasn't been touched; it's still charged out to the same code. Since the test terminals operate independently of the live system, you have a great deal of flexibility to experiment, and you don't even have to clean up after yourself.

Believe it or not, there is a fairly logical sequence in which to test the software:

- ❑ determine the accuracy of the data transfer for the patron, transaction, and the holdings files,
- ❑ confirm that that the functions, such as Charge, Renew, In-transit, and so on work as intended,

- ❑ verify that parameters are loaded correctly. This is to ensure that loan periods are correct, that fines calculate correctly, blocks work correctly, and so on,

- ❑ perform as best a stress test as you can. Make sure you really can do a renew-all on an account with 700 books charged to it, that you can manipulate a bindery account with 1,400 titles attached to it, and so on.

O.K., we'll go through these one by one.

Files

First, determine the accuracy of the data transfer. Start with the holdings file. Remember all the printouts of the Holdings Edit screens? This is when you use them. Record by record, compare the printouts to the test screens. Check the call numbers (particularly if you're transferring into buckets), check the titles, the unique identifier, the media codes, and everything. The purpose is to make sure that all the fields transferred, the 3's didn't transfer as 8's, and so on.

Record the discrepancies directly on the printout. If there are any problems, it won't take long for the patterns to emerge. Soon you'll have multiple examples of a particular problem along with specific records in which it occured. You can either fax the printouts to CARL, write an email note identifying the specific records, or discuss it over the phone. Whatever you do, don't throw the printouts away. Because at some point, CARL will report that the problem is fixed. You'll need to refer back to the printouts to find the specific records. Having the original notes in front of you is very useful, too.

Use the same process to check the accuracy of the patron records. Using the printouts as masters, check that the ID numbers are correct, that the addresses are

properly placed and the address flags are properly set, and so on. Again, any discrepancies are recorded on the printout, reviewed, reported to CARL, printouts filed, then pulled out again to review the fixes.

Checking the transactions can be slightly more problematic than working with the holdings or patron records. Basically, you will check that titles have remained the same, due dates haven't changed, holds and recalls are still in place, blocks are present, fines transferred into the Archive correctly, and any notes transferred properly. But there could be last minute activity on the patron's account that appears as a conversion discrepancy. So you may have to backtrack to the live system to confirm the accuracy of some records.

If all this sound tedious, it is. But having the printouts made in advance saves a lot of time during this phase: you don't have to run from a live terminal to a test terminal, the printout is a convenient form for recording discrepancies, and it provides a permanent record so that you can do follow up easily.

Functions

Once satisfied that the data files transferred accurately and that any problems are resolved, you can move on to testing functions. This is a more ambiguous process than checking the files for accuracy, and, to some degree, more serendipitous.

The intent is to confirm that the functions and features perform as they are supposed to. Do not assume that they will. Either because of faulty code or because of peculiarities of CU Boulder libraries, we identified several functions and features that needed work. The In-transit, Added Borrower, and Renew-All functions, at one time or another, didn't work for us.

The circulation manual is a good guide to use in evaluating the functions. Literally, you can start on page one and work through charge, renew, return, and so on. At this point you are basically confirming that functions work as they should. You'll need to perform a few dozen transactions for every function. Check that the features interact properly with your records. Make sure that the bridges work.

There's a lot of stuff to check, and don't just check the new features. Check everything. Just because a function worked in a certain way in the old system doesn't mean it will work the same in the new. Many of us have installed unique, enhancements to make the system perform in a particular way. Those old enhancements may not be in the new system. So you want to identify those absent enhancements that are no longer layered into the software and determine if you still need them or not.

Once satisfied that the functions and features are sound, you can begin testing parameters. The tables that I described earlier really speeds this process. Simply have someone fill in the blanks based upon the system results and compare the completed grid with a master copy. Double-check the discrepancies and report any problems. At some point CARL will report back that they are fixed. Go back and check them again. Our experience was that parameters would somehow slip. One day things would function correctly and then not the next. So plan to check the parameters several times.

Checking the functions and observing how features interact with various types of records is a particularly long process. You have to do a lot of transactions with a lot of different records to identify patterns. And it's often difficult to stay focused since

one thing leads to another. You may see the results of a problem while looking at Inquiry but, in the process of tracking the cause, end up in Holdings Edit. Meanwhile, you'll have questions about two other things along the way.

Document suspected problems as carefully as possible. Describe the problem clearly and always submit multiple examples of what you report. We found that the more analysis we did on a problem before reporting it, the more likely the problem would be resolved quickly.

So, at this point you've:

- ❑ confirmed the accuracy of the records,
- ❑ tested functions, and,
- ❑ confirmed that the parameters are set correctly, and that there are no unexpected interactions between the parameters and the features.

You'll have identified a lot of problems and, hopefully, have them mostly resolved. You'll also have a good idea about what is outstanding and how well the system is functioning as a whole.

Since about 80% of the testing is completed, this point would be a good time to prioritize the remaining outstanding problems. Then communicate to CARL how much of that list must be functioning before you will agree to go live. Be sure to get the list to them in a reasonable amount of time.

The final thing you want to do is stress testing. Now, you won't be able to do a true stress test. But, you can have a good time trying to crash the system.

Stress testing is the electronic equivalent of slash and burn. For example, find a patron's account with 400 or 500 books on it. Charge another 400 or 500 to it—all the books you have on hand for testing—then do a renew-all. Interrupt the renewal process three quarters of the way through. Go back and stack multiple recalls and holds on 200 or 300 of the books then renew them, and so on. Cause all 900 of them to go overdue at once. Make bizarre fine payments. Watch for things such as response time, accuracy in screen displays, and so on.

As the dates for implementation are confirmed, you'll want to get some memos out explaining what's happening to the other departments. Naturally, you want to make sure the circulation desk staff know what to expect and you may want to consider last minute training. Finally, and this is important, once the system goes live be sure to retest critical things such as parameters and functions.

OK, to sum up:

- ❑ make testing a priority,
- ❑ don't underestimate the time and labor involved,
- ❑ don't assume that because someone else has implemented this system that all the bugs are resolved, and, finally,
- ❑ identify key individuals and keep them informed.

ABSTRACT

This paper, originally presented at the Second Annual CARL User's Group Meeting in September of 1992, outlines the implementation and testing procedures used at the University of Colorado's Boulder Campus in the implementation of the CARL version C100 circulation system.

The paper outlines a broad approach to testing new circulation software, describes procedures that speed and organize the process, and suggests staffing levels and equipment to have available. The focus is on describing methods to test the accuracy of data transfer, determine the functionality of the features, and to confirm that the local parameters interact properly with all circulation functions.

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